

①
6AV6

67.5 KC TRAP — MIN AT ② VTVM

V₁ 245V C₉ .1/200V

POM5327

10K

3

5K

430

1

82

8.2K

510

2

510

1

8.2K

510

1

MULTIPLEX ALIGNMENT PROCEDURE

STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	ADJUST	ADJUST FOR
1	T ₂	AUDIO GEN SET TO 67.5KC	(B)	VTVM AT (A)	TOP & BOTTOM OF T ₂	MINIMUM
2	T ₃ 19KC TRANS.	FM SIGNAL GEN MODULATED 30% BY STEREO GEN (CHANNEL A)	ANTENNA TERMINALS. TUNE TO SIGNAL	(D)	TOP & BOTTOM OF T ₃	MAX DC VOLT- AGE ACROSS R25 WITH NEON BULB DISCONNECTED
3	T ₁ 36KC DOUBLER	SAME	SAME	(C)	TOP & BOTTOM OF T ₁	MAXIMUM
4	T ₁ 36KC DOUBLER	SAME	SAME	SCOPE AT OUTPUT (CHANNEL B)	TOP & BOTTOM OF T ₁	MINIMUM
5	AUDIO GENERATOR					

CAUTION:
DO NOT ATTEMPT ALIGNMENT
UNLESS FOLLOWING EQUIPMENT
IS AVAILABLE;
1-MULTIPLEX STEREO GENERATOR
2-FM SIGNAL GENERATOR
3-OSCILLOSCOPE
4-AC VTVM
5-AUDIO GENERATOR

ALIGNMENT PROCEDURE

Control Settings: Automatic frequency Control off.
Interchannel Muting Switch off.
Range Switch in "Distant" position.

STEP	ALIGN.	GENERATOR SETTING		FEED SIGNAL	OUTPUT IND.	DIAL SETTING	ADJUST	ADJUST FOR	NOTES
		FREQ.	MODULATION						
1	IF	10.7 MC	None	See Note, last column	VTVM at IF Test Point	90 MC	1st, 2nd, 3rd, 4th IF Tran.	Maximum	Remove ECC85 tube
2	Oscillator	90 MC	None	Antenna Terminals	Same	90 MC	Osc. Coil	Maximum	Couple signal by loop around tube.
3	Oscillator	106 MC	None	Same	Same	106 MC	Osc. Trimmer	Maximum	
4	Repeat steps 2 and 3								
5	RF Amplifier	90 MC (See Note)	None	Same	90 MC	Antenna Coil, RF Cathode Coil, RF Plate Coil	Maximum	Alternatively, an FM station near specified frequency may be used as a signal source for steps 5 & 6.	
6	RF Amplifier	106 MC	None	Same	106 MC	Antenna Trimmer, RF Cathode Trimmer, RF Plate Trimmer	Maximum		
7	Repeat steps 5 and 6.								
8	Discriminator Transformer Primary (See Note)			Balance Meter	Off Station	Disc Primary (Bottom)	Maximum Positive Indication	Rotate top slug of discriminator transformer fully counter-clockwise before adjusting discriminator primary	
9	Discriminator Transformer Secondary			Balance Meter	Off Station	Disc Secondary (Top)	Zero on Balance Meter		

ALIGNMENT PROCEDURE

Control Settings: Automatic Frequency Control off. Intercannel Muting Switch off. Range Switch in "Distant" position.

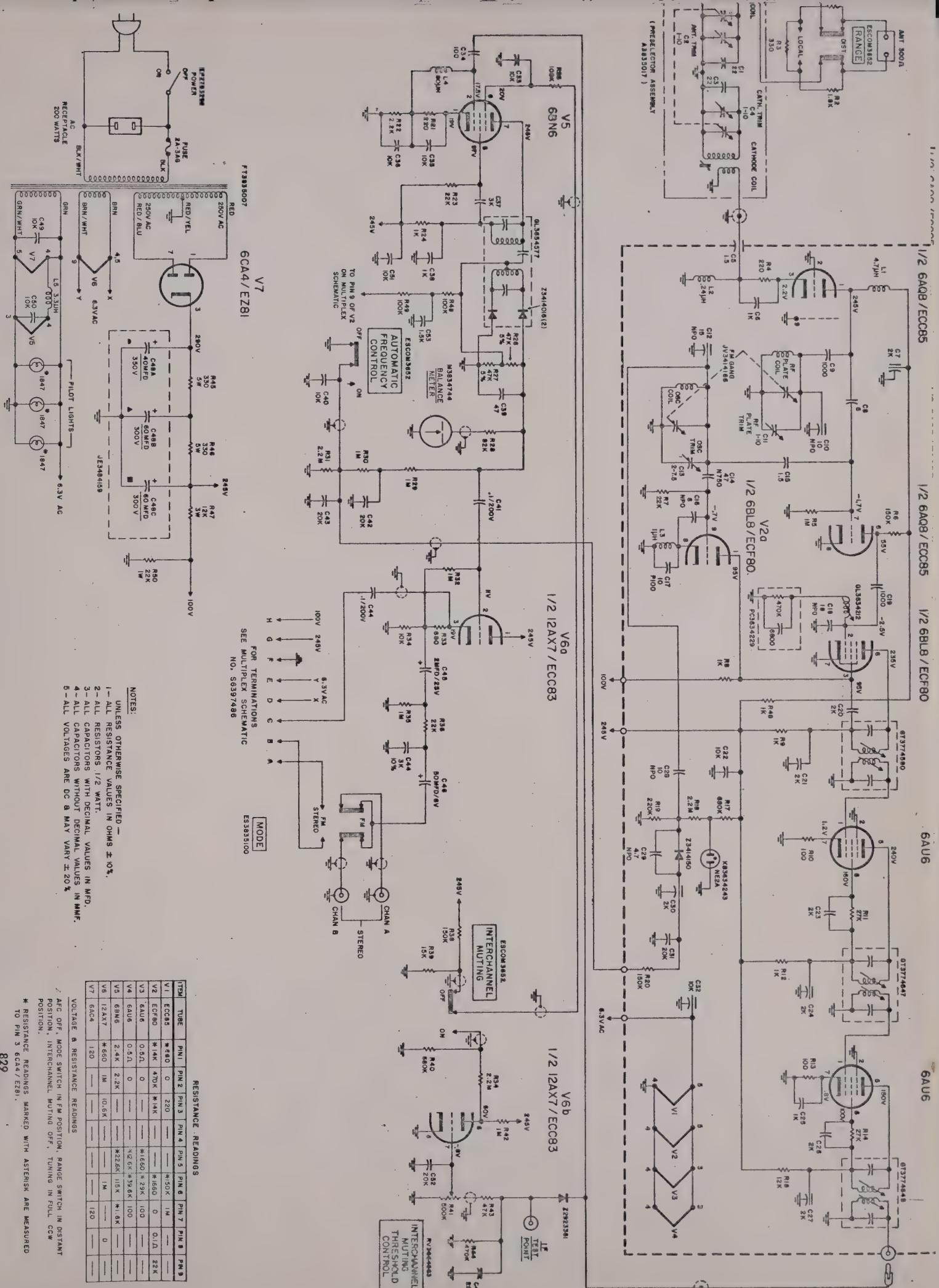
STEP	ALIGN.	GENERATOR SETTING		FEED SIGNAL	OUTPUT IND.	DIAL SETTING	ADJUST	ADJUST FOR	NOTES
		FREQ.	MODULATION						
1	IF	10.7 MC	None	See Note, last column	VTM at IF Test Point	90 MC	1st, 2nd, 3rd, 4th If Tran.	Maximum	Remove ECC85 tube
2	Oscillator	90 MC	None	Antenna Terminals	Same	90 MC	Osc. Coil	Maximum	Couple signal by loop around tube
3	Oscillator	106 MC	None	Same	Same	106 MC	Osc. Trimmer	Maximum	
4	Repeat steps 2 and 3.								
5	RF Amplifier (See Note)	90 MC	None	Same	Same	90 MC	Antenna Coil, RF Cathode Coil, RF Plate Coil	Maximum	Alternatively, an FM station, near specified frequency may be used as a signal source for steps 5 & 6.
6	RF Amplifier	106 MC	None	Same	Same	106 MC	Antenna Trimmer, RF Cathode Trimmer, RF Plate Trimmer	Maximum	
7	Repeat steps 5 and 6.								
8	Discriminator Transformer Primary (See Note)	Remove Generator Tune Out Station	Balance Meter	Off Station	Disc Primary (Bottom)	Maximum Positive Indication	Rotate top slug of discriminator transformer counter-clockwise before adjusting discriminator primary		
9	Discriminator Transformer Secondary	Balance Meter	0H Station	Disc Secondary (Top)	Zero on Balance Meter				

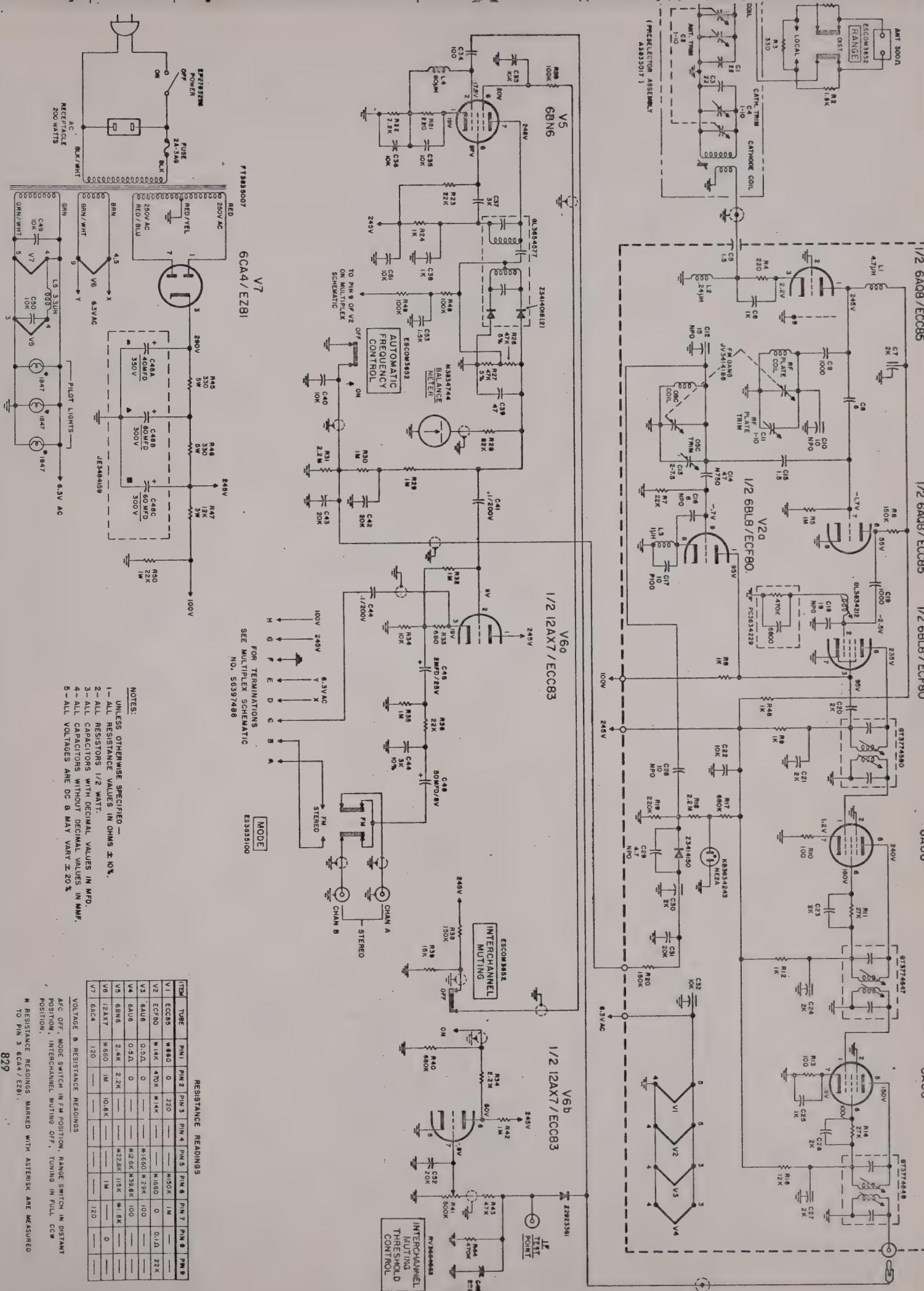
MULTIPLEX ALIGNMENT PROCEDURE

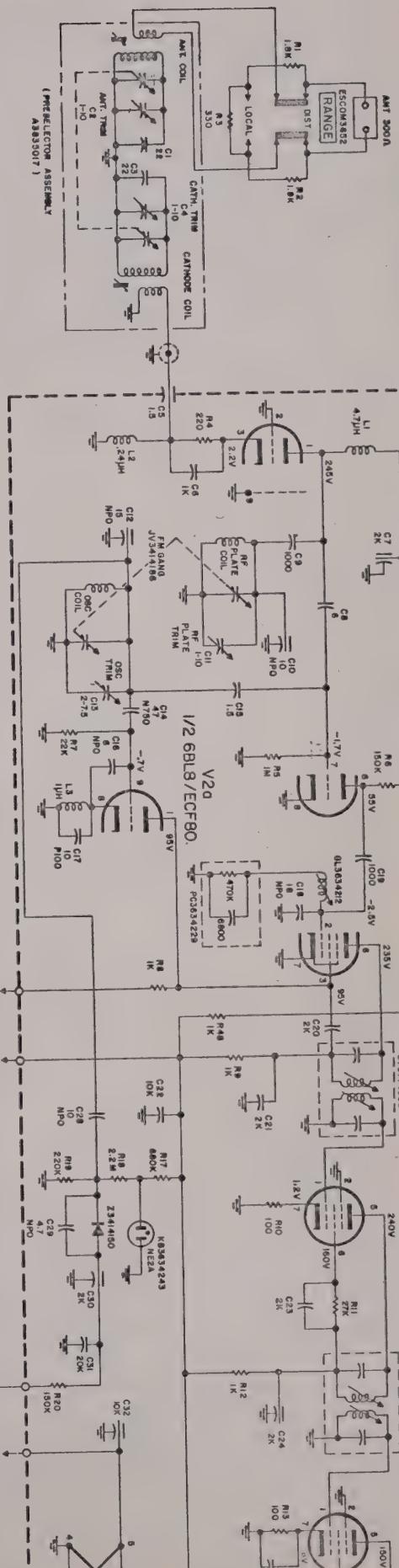
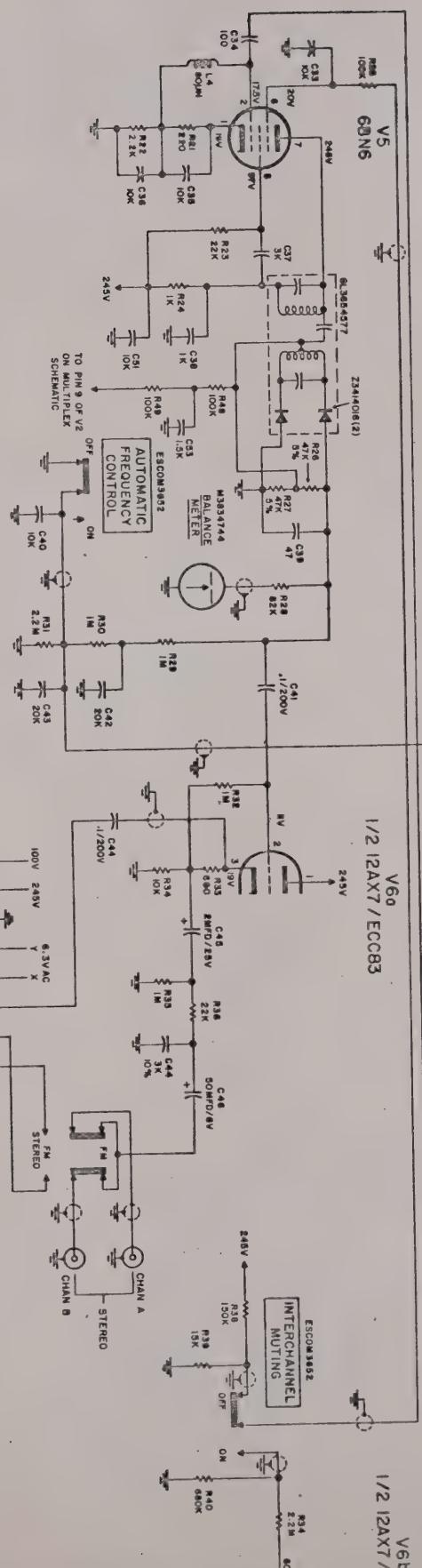
STEP	ALIGN	GENERATOR	FEED SIGNAL	OUTPUT INDICATOR	ADJUST	ADJUST FOR
1	T2	AUDIO GEN SET TO 67.5KC	⑥	VTVM AT ④	TOP & BOTTOM OF T2	MINIMUM
2	T3 19KC TRANS.	FM SIGNAL GEN MODULATED 30% BY STEREO GEN (CHANNEL A)	ANTENNA TERMINALS. TUNE TO SIGNAL	⑦	TOP & BOTTOM OF T3	MAX DC VOLT- AGE ACROSS R25 WITH NEON BULB DISCONNECTED
3	T1 33KC DOUBLER	SAME	SAME	⑧	TOP & BOTTOM OF T1	MAXIMUM
4	T1 38KC DOUBLER	SAME	SAME	SCOPE AT OUTPUT (CHANNEL B)	TOP & BOTTOM OF T1	MINIMUM

CAUTION:

DO NOT ATTEMPT ALIGNMENT
UNLESS FOLLOWING EQUIPMENT
IS AVAILABLE:
1-MULTIPLEX STEREO GENERATOR
2-FM SIGNAL GENERATOR
3-OSCILLOSCOPE
4-AC VTVM
5-AUDIO GENERATOR

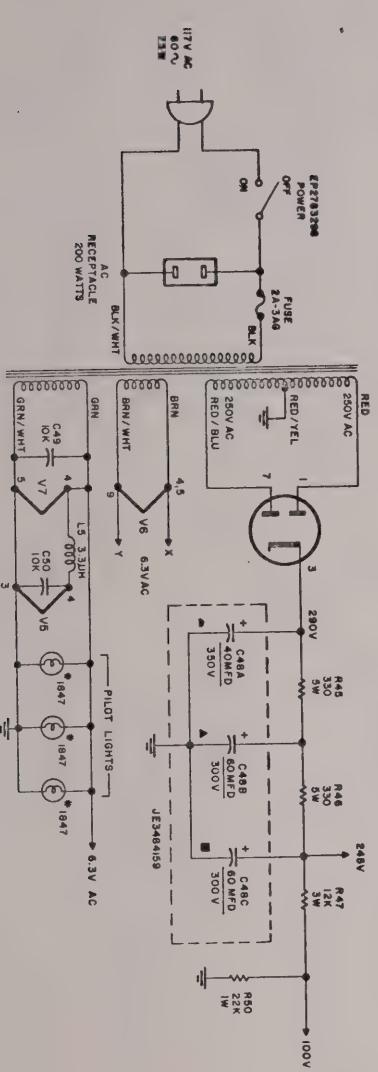




V60
1/2 12AX7 / ECC83SEE MULTIPLEX SCHEMATIC
NO. S6397488ES6835100
NODE

NOTES:

- UNLESS OTHERWISE SPECIFIED —
- 1 — ALL RESISTORS 1/2 WATT.
- 2 — ALL RESISTORS WITH DECIMAL VALUES IN OHMS $\pm 10\%$.
- 3 — ALL CAPACITORS WITH DECIMAL VALUES IN MFD.
- 4 — ALL CAPACITORS WITHOUT DECIMAL VALUES IN MMF.
- 5 — ALL VOLTAGES ARE DC & MAY VARY $\pm 20\%$.

RESISTANCE
ITEM TUBE PIN 1 PIN 2 PIN 3
V1 ECC85 4.6K 0 220
V2 ECF80 1.4K 4.7K 1.4K
V3 6AU6 0.5Ω 0 —
V4 6AU6 0.5Ω 0 —
V5 6BN6 2.4K 2.2K —
V6 12AX7 4.6K 10.6K —
V7 6CA4 120 — —F7383807
6CA4/EZ81SEE MULTIPLEX SCHEMATIC
NO. S6397488ES6835100
NODEEP278326
POWER
OFF
2A-340
BLKA.C.
RECEIPLINE
BLK/WHIT

200 WATTS

250V AC

RED

RED/YEL

7

250V

SW

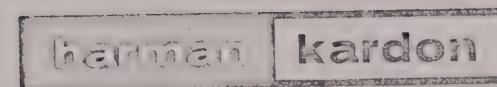
3W

3W

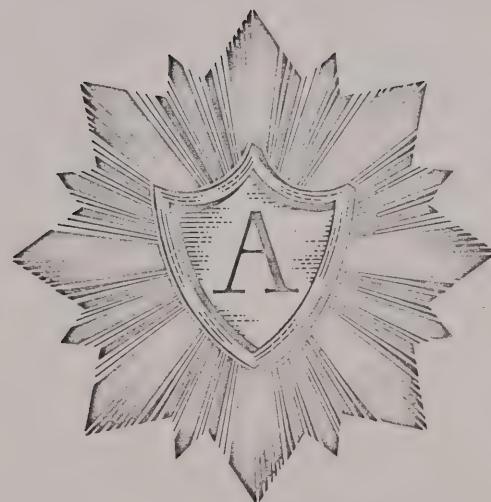
3W

3W

245V



The Award Series



**INSTALLATION
AND OPERATING MANUAL**

F 500X

FM STEREO TUNER

INTRODUCTION

The new Harman-Kardon Award Series represents the culmination of extensive research and experimentation in high fidelity component design. These magnificent instruments will satisfy the aspirations of those who insist on nothing short of perfection itself. They also anticipate all of the new developments in high fidelity by including features never before found in high quality components. The keynote in the Award Series is unparalleled performance and no compromise has been made in the design of these superb units.

It is essential you read this instruction manual carefully before installing your F500X FM tuner. You have invested in a high quality electronic instrument and a few moments taken now to read this manual may save considerable time and effort later on. This booklet has been written in simple, non-technical language and by following the recommendations made in the manual you should be able to obtain optimum performance from your stereophonic system.

**KEEP THIS INSTRUCTION MANUAL AVAILABLE AT ALL TIMES.
IT CONTAINS INDISPENSIBLE TECHNICAL AND SERVICE INFORMATION.**

UNPACKING

After unpacking the F500X, inspect it carefully for signs of transit damage. The tuner was subjected to numerous rigid quality control inspections and therefore should be in perfect operating condition. If damage is visible, notify your dealer at once. If the tuner was shipped to you, notify the transportation company. Harman-Kardon will cooperate with you in such instances, but please note that only you can recover from the carrier for damages incurred during shipment.

Check the folds of the carton and packing material before discarding. Your package should contain the following items:

- 1 Award Series, Model F500X FM Stereo Tuner.
- 1 Instruction Manual.
- 1 Warranty Card.
- 1 Mounting Template.

WARRANTY POLICY

We urge you to fill in your warranty card and mail it to the factory without delay to protect your rights under warranty. The Harman-Kardon warranty is not valid unless we have your card on file.

WARRANTY

We warrant each F500X to be free from defects in material and workmanship under normal use and service, and in accordance with the conditions herein below set forth, for a period of 1 year from date of delivery to the original purchaser, and agree to replace or repair any part or parts, with the exception of tubes which are under the manufacturer's 90 days warranty, returned to us within said 1 year, with transportation prepaid and which our examination shall disclose to our satisfaction to have been thus defective. This warranty does not include free labor, nor is it applicable to any instrument which shall have been repaired or altered in any way so as in our judgment to affects its stability or reliability nor which has been subject to neglect, misuse, abuse, negligence or accident nor which has had the serial number altered, effaced, or removed. Neither shall this warranty apply to any instrument which has been connected otherwise than in accordance with instructions furnished by us.

This warranty is expressly in lieu of all other warranties, express or implied, and of all other obligations or liability on our part, and we neither assume nor authorize any representative or other person to assume for us any other liability in connection with the sale of this instrument.

SERVICE POLICY

Harman-Kardon has established a special consumer division to answer all questions pertinent to the installation and operation of your unit. Please feel free to write us at any time and we will endeavor to offer prompt and complete advice.

If your problem cannot be resolved through our combined efforts then we may wish to refer you to one of our authorized warranty stations. The unit must be then shipped via Railway Express, Prepaid to the station designated, accompanied by a brief note describing the exact nature of the difficulty. Under no circumstances should the set be shipped directly to the factory without prior authorization.

INSTALLATION PROCEDURE

Ventilation:

The F500X tuner is well ventilated in itself, but sufficient space must be allowed around it to permit proper air flow. Install the tuner in a manner to allow for unrestricted circulation. When mounting into a cabinet allow at least 3 inches above the tubes. Do not place books or other objects on the cage or in the immediate vicinity of the instrument. Reducing the air flow will result in sharply reduced component and tube life. Caution: When custom installing the tuner do not place it directly over the amplifier. The heat generated by the amplifier may cause deterioration of tuner components.

Power Requirements:

Plug the AC cord into any outlet furnishing 117 volts, 50 or 60 cycle, AC current. The voltage may vary between 105 and 125 volts. An AC convenience receptacle is located on the top of the chassis and is controlled by the on/off switch.

Audio Output:

Two AUDIO OUTPUT receptacles are located on the rear of the tuner chassis. They are used to connect the tuner to your amplifier.

For monophonic operation connect a shielded patch cord between either the Channel A or Channel B AUDIO OUTPUT receptacle and the TUNER or AUX input of your amplifier.

For stereophonic operation connect two shielded patch cords between the Channel A and Channel B AUDIO OUTPUT receptacles and the stereo TUNER or AUX input receptacles of your amplifier.

The special de-emphasis characteristic of the F500X includes the capacitance of the shielded connecting cable supplied with the tuner. If it is required to use a patch cord longer than three feet, please use the following chart to determine cable type.

LENGTH OF CABLE	CABLE TYPE
3 feet	Shielded patch cord
3-10 feet	RG 59/U
10-20 feet	RG 71/U

Connecting the FM Antenna:

Due to the exceptionally high sensitivity of the F500X the 48 inch wire antenna supplied with the tuner is sufficient for all but the most difficult locations. The antenna input is designed to accept either the wire antenna or a balanced 300Ω antenna, indoor or outdoor type.

When using the wire antenna supplied, the link between the ground terminal and the center terminal should be connected, and the wire antenna is to be connected to the third terminal marked "connect link to use wire antenna".

When using a balanced 300Ω antenna, remove the link and connect the antenna on terminals marked "remove link to use 300Ω antenna".

In more remote locations, an outside Yagi, folded dipole or omni-directional antenna is recommended. For the greatest gain, a 4 to 11 element Yagi designed for the FM band is suggested. A Yagi, however, is very directional and it may be desirable to use an antenna rotor if a full 360° coverage is required. For reception in the suburbs, an outside folded dipole or omni-directional dipole is recommended.

Grounding:

It is not generally recommended to ground the F500X to your companion amplifier as this may result in a ground loop which will introduce hum into your system.

OPERATING INSTRUCTIONS

The F500X incorporates the following operating controls: Automatic Frequency On/Off Switch, Mode Selector, Range Selector, Interchannel Muting Switch, Illuminated Push-Button On/Off Switch, Balance Tuning Meter, Tuning Control, and Multiplex Scratch Filter.

Illuminated Push-Button On/Off Switch:

This control turns the tuner on and off. It also controls the AC convenience outlet located at the rear of the tuner.

Automatic Frequency Control Switch:

FM broadcasting, by its very nature, eliminates almost all natural and man-made static. However, the characteristics of FM which make this possible also causes specific problems in tuning. The F500X incorporates a special electronic circuit known as AFC (automatic frequency control) that overcomes these problems and insures proper tuning even if the manual tuning is not accurately done. Therefore AFC always keeps the station in the center of the channel and eliminates distortion caused by inaccurate tuning.

It should be made quite clear that AFC is not a means to eliminate tuner drift. A fine wide band tuner will not drift even upon warm-up whether AFC is in the circuit or not.

The following experiment will lead to an understanding of AFC and how it performs its job.

Throw the AFC switch located on the front panel to "ON". Now tune across the FM band and note how the stations "pop" into place. Now tune to any station, preferably one with a musical program. Defeat the AFC circuit by throwing the AFC switch to "OFF", and tune slowly through the station from left to right. Notice there are three distinct points where the station sounds clear, interspersed with points of distorted sound. The middle, clear-sounding point is the proper tuning position for the best tone quality with minimum noise, distortion and interference. Detune the station slightly so that the sound is distorted. Now throw the AFC switch "ON" and notice how the station retunes itself and the sound clears up. The AFC circuit has readjusted the electronic circuits to the center of the station channel.

In order to take full advantage of the benefits of AFC, it is suggested that fine tuning be done with the AFC switch "OFF". When the station is aurally tuned in, throw the AFC switch "ON" and the AFC circuit will retune your careful tuning

by a tuning factor of 10:1. This procedure is especially recommended when a weak station is being tuned on a channel adjacent to a stronger one. This will prevent the AFC from reaching for the more powerful signal thereby skipping over the weaker one. Whenever a weak station is being tuned, the AFC should be defeated.

Mode Selector Switch:

This switch selects between ordinary FM and FM Multiplex operation. For conventional FM listening allow the switch to remain in the "FM" position.

Multiplex Indicator Light:

The FM STEREO light will automatically switch on if the station you are tuned to is broadcasting FM multiplex. When the light goes on, the MODE switch should be placed in the FM/MX position to receive FM multiplex broadcast.

Interchannel Muting Switch:

The purpose of the muting circuit is to reduce audible noise when tuning from station to station. Since very weak signals may be muted at the same time, the front panel INTERCHANNEL MUTING switch may be used to defeat the muting circuit on weak signals.

To eliminate interstation noise, throw the INTERCHANNEL MUTING switch "ON". To defeat the circuit, throw the switch "OFF".

Balance Meter:

The F500X FM tuner incorporates a D'Arsonval movement tuning meter for precise tuning. The BALANCE METER is used to tune to the exact center of the station channel and proper tuning is achieved when you are on a station and the BALANCE METER reads "O".

Dial Scale:

The F500X Dial Scale is marked with two scales, a frequency scale (88-108 MC), and a logging scale (0-100). Since most FM stations operate on frequencies which are not whole numbers (such as 96 MC as compared to 96.3) ideally each megacycle division on the frequency scale should be divided into 10 parts to enable the user to pinpoint the location of the station. This would require a dial scale which would be longer than the front panel.

The logging scale which is divided into 100 equal parts provides a means of finding your favorite station, once you have noted its position on the logging scale. For example, in New York City, WQXR operates on 96.3MC. After locating this station through the use of the frequency scale (between 96 and 98 MC), you find that the pointer falls on 46 on the logging scale. Make a note of this setting and when you next want to tune to WQXR, all that is necessary is to set the pointer to 46 on the logging scale.

Interchannel Threshold Adjustment:

This control is located on the top rear of the chassis and should be adjusted as follows: Tune in the weakest station in your area with the front panel Interchannel Muting switch in the "OFF" position. Tune off the station and throw the Interchannel Muting Switch "ON". Using a small screwdriver, rotate the "Threshold Adjustment" clockwise. Then rotate counter-clockwise until only a faint hiss is heard. Tune in again to the weak signal. If it still can be heard, and noise present off station is negligible, the adjustment can be considered satisfactory. NOTE: Maximum sensitivity is obtained with the Interchannel Muting Switch in the "OFF" position.

Range Switch:

The full sensitivity of the F500X is utilized when the RANGE switch is in the "DISTANT" position. However, on extremely strong signals, the switch should be

in the "LOCAL" position to prevent overloading of the input stage. In FM stereo operation the RANGE switch must be in the "DISTANT" position.

Operating the F500X for FM Stereo Reception:

The FM STEREO light will automatically switch on if the station you are tuned to is broadcasting FM multiplex. When the light goes on, the MODE switch should be placed in the MX position to receive FM multiplex broadcast in stereo.

If the stereo FM signal is received with a hissing or rushing noise, set the multiplex NOISE filter switch to "IN."

The NOISE filter is operative only when the tuner is in the "MX" position.

ADDITIONAL INFORMATION

Fuse:

The F500X is protected by a 2 Amp-3AG fuse. In the event the fuse blows out, replace with only the same type used. Replacing with a fuse of a higher rating will not protect the tuner and will automatically void the warranty.

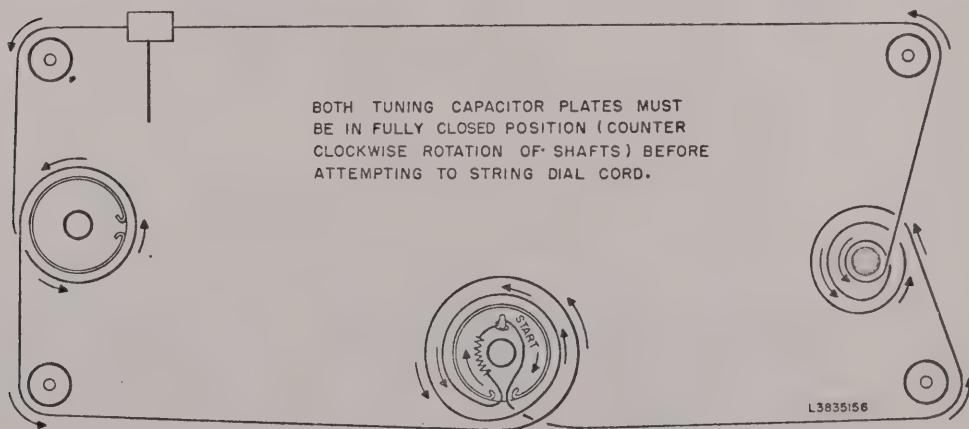
Routine Maintenance:

Due to the conservative design of the F500X, no routine maintenance other than yearly tube checking is required.

Repair:

Only the most qualified service technician should be employed, as special equipment and training is required to properly service a high fidelity instrument. This manual contains information of great value to the repairman, and should be kept available.

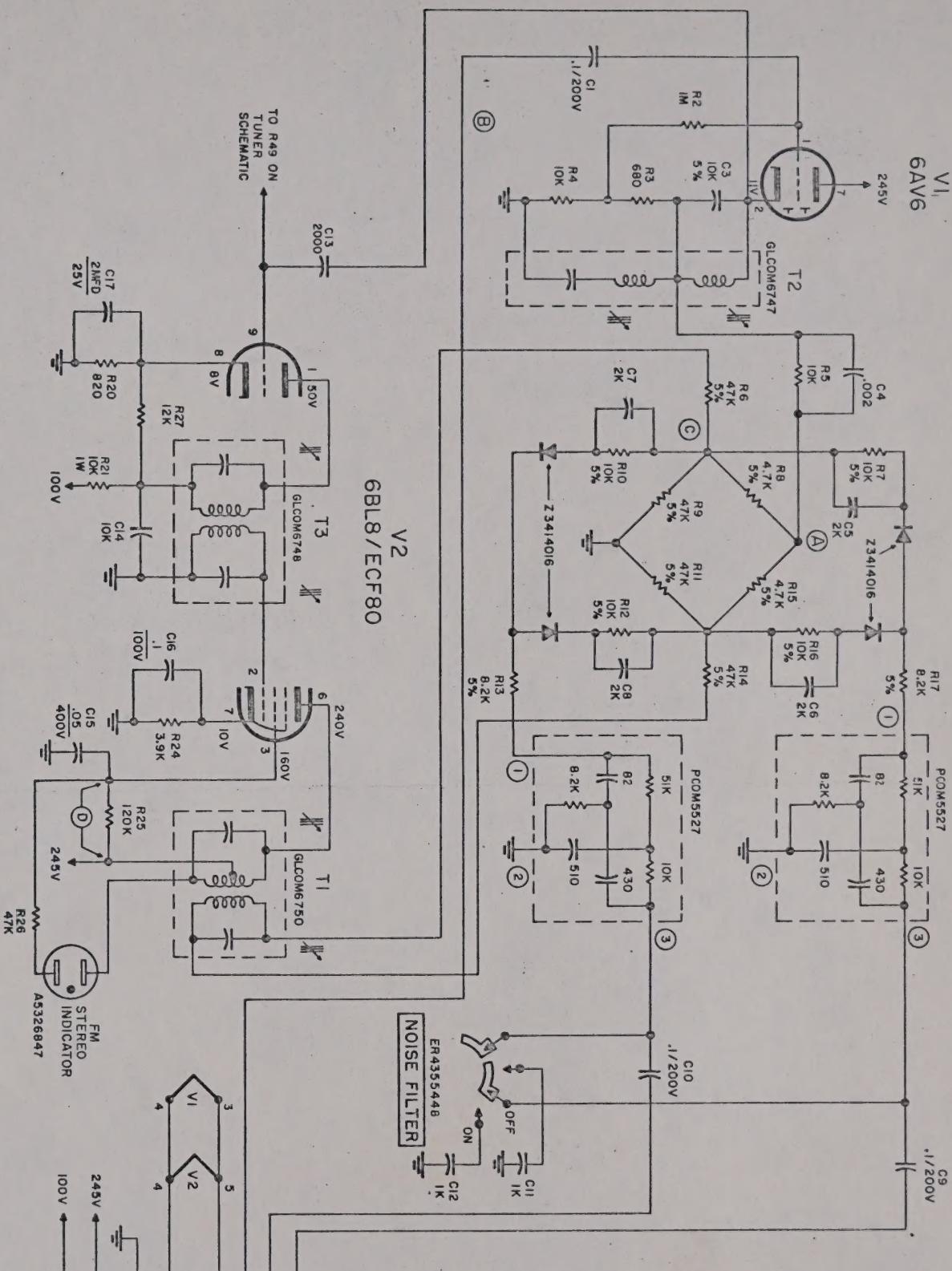
Factory Warranty Stations are maintained in most major cities. For the address of the nearest one, or for any other information relating to your Harman-Kardon products, write to the attention of the Customer Service Department, Harman-Kardon, Inc., Plainview, L. I., N. Y. Be sure to include the model and serial number of the set in question. A short description of your complete installation is often of help in answering your questions.



MODEL F500X PARTS REPLACEMENT LIST

PART NO.	DESCRIPTION	PRICE
STCOM4566	Antenna Term Strip	.20
HC24625	AC Convenience Outlet	.20
STCOM5971	Phono Socket (2 Jack)	.30
P3824652	Bottom Plate	3.75
P3834748	Chassis Front Panel	9.15
ESCOM3652	Slide Switch (Grey)	1.00
ES3835100	Slide Switch (Grey)	1.00
HCOM3750	Fuse Holder	.85
ZCOM2856	Fuse 2 Amps (3 AG)	.10
JE3484159	Capacitor, 40/350 60-60/300	3.30
FT3835007	Power Transformer	11.75
M3834744	Meter (Balance)	8.25
KB1142117	Pilot Light #1847	.25
P3836997	Dial Glass	1.10
ER3654563	Control (Squelch)	.75
EP2783298	Power Switch	.75
Z3414016	IN541	pr. 1.80
GL3654577	Discriminator	5.00
RS3654592	330 Ohms 5W 10%	.30
RSCOM3692	12K 3W	.50
JE3283790	Electrolytic 2 μ fd 25V	.85
JE3584255	Electrolytic 50 mfd 6V	.40
Z2923361	Diode 1N87A	1.00
GC3654594	Choke 80 μ h	.50
GC2503070	Choke 3.3 μ h	.50
PC3825094	Jewel On-Off Power	.15
P3824999	Jewel Pilot Light	.15
B3835445	Escutcheon	6.40
P3835004	Knob	1.00
ER4535448	Noise Filter Switch	1.00
Z3414016	Crystal diode—1N542	pr. 1.80
GLCOM6157	38KC doubler	2.50
GLCOM6156	19KC coil	2.00
GL4725680	Sub carrier filter	2.00
PCCOM5527	38KC filter	2.50
A5326847	FM Stereo Lamp Assy.	1.35

NOTE: To speed handling of your order be sure to include both the model and serial numbers which appear at the back of the chassis, in addition to the quantity, part number and part description of the items ordered. Orders from independent dealers, independent servicemen, and retail customers will be shipped on a C.O.D. basis except for orders \$1.00 or less, for which remittance should be enclosed. Prices subject to change without notice. Harman-Kardon reserves the right to substitute equivalent parts for those originally installed in this chassis.



RESISTANCE READINGS

FOR TERMINATIONS
 SEE TUNER SCHEMATIC
 NO. S6407485

ITEM	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 7	PIN 8	PIN 9
V1	6AV6	1 MEG	16K	—	—	—	*660Ω	—	—
V2	6BL8	* 6K	230Ω	*120K	—	—	* 660	3.9K	1.5K 470K

* RESISTANCE READINGS MARKED WITH ASTERISK ARE MEASURED FROM
 PIN 3 6CA4/EZ81.

